

Maximum Permissible Exposure Evaluation

FCC ID:2BAQT-ITRONBELL

IC:30320-ITRONBELL

1. Client Information

Applicant	:	iTronics Limited
Address	:	PO BOX 303 264, North Harbour, Auckland 0751, New Zealand
Manufacturer	:	iTronics Limited
Address	:	PO BOX 303 264, North Harbour, Auckland 0751, New Zealand

2. General Description of EUT

EUT Name	:	iTronBELL
Model(s) No.	:	iTronBELL
Model Difference	:	----
Product Description	:	Operation Frequency: 915 MHz Bluetooth V5.0(BLE):2402MHz~2480MHz 2.4G WiFi: 2412MHz~2462MHz
	:	Antenna Gain: 0.5dBi PCB Antenna for BLE 2.62dBi FPC Antenna for 2.4G WiFi -1.17dBi FPC Antenna for 915 MHz
Power Supply	:	Input: DC 5V, 1.5A DC 3.7V by 5200mAh Rechargeable Li-ion battery
Software Version	:	----
Hardware Version	:	----
Remark: The antenna gain provided by the applicant, the adapter and verified for the RF conduction test and adapter provided by TOBY test lab.		

Note: More test information about the EUT please refer the RF Test Report.

MPE Calculations

1. Antenna Gain:

PCB Antenna for BLE: 0.5dBi.

FPC Antenna for 2.4G WiFi: 2.62dBi.

PCB Antenna for 915: -1.17dBi.

2. EUT Operation Condition:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3. Exposure Evaluation:

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=(PG)/4\pi R^2$$

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna

4. Test Result:

Worst Maximum MPE Result								
BLE								
Mode	N _{TX}	Freq. (MHz)	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/ cm ²) [S]
1Mbps	1	2402	-2.13	-2±1	-1	0.5	20	0.0002
		2440	-2.372	-2±1	-1	0.5	20	0.0002
		2480	-2.452	-2±1	-1	0.5	20	0.0002
2.4G WiFi								
802.11b	1	2412	16.092	16±1	17	2.62	20	0.0182
	1	2437	15.998	16±1	17	2.62	20	0.0182
	1	2462	16.933	17±1	18	2.62	20	0.0229
802.11g	1	2412	14.26	14±1	15	2.62	20	0.0115
	1	2437	16.095	16±1	17	2.62	20	0.0182
	1	2462	15.053	15±1	16	2.62	20	0.0145
802.11n20	1	2412	13.416	13±1	14	2.62	20	0.0091
	1	2437	16.025	16±1	17	2.62	20	0.0182
	1	2462	14.079	14±1	15	2.62	20	0.0115
Note:								
(1) N _{TX} = Number of Transmit Antennas								
(2) RF Output power specifies that Maximum Conducted Peak Output Power.								

$$E = \text{EIRP} - 20 \log D + 104.8$$

where:

E = electric field strength in dB μ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

$$\text{EIRP} = E - 104.8 + 20 \log D = 77.71 - 104.8 + 20 \log 3 = -17.55 \text{ dBm}$$

Frequency (MHz)	Measured Power (dBm)	Tune up Tolerance $\pm$ (dB)	Output power (Max. Turn-up Procedure) (mW)	Limit (mW)
915	-17.55	-18 $\pm$ 1	0.0200	0.61

Note: At separation distance of > 20 mm

5. Conclusion:

As specified in Table 1B of 47 CFR 1.1310- Limits for Maximum Permissible Exposure (MPE),

Limits for General Population/ Uncontrolled Exposure

Frequency Range (MHz)	Power density (mW/ cm ²)
300-1,500	F/1500
1,500-100,000	1.0

For BLE&2.4GWIFI&915

MPE limit S: 1mW/ cm²

WIFI MPE (Ratio)	BLE MPE (Ratio)	915 MPE (Ratio)	simultaneous MPE (Ratio)	MPE Limits (Ratio)
0.0229	0.0002	0.0200	0.0431	1.0000

So, RF exposure limit warning or SAR test are not required.

The EUT will only be used with a separation of 20cm or greater between the antenna and nearby persons and can therefore be considered a mobile transmitter per 47 CFR2.1091 (b).

The RF Exposure Information page from the manual is included here for reference.

Note

For a more detailed features description, please refer to the RF Test Report.

6. Conclusion:

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

-----END OF REPORT-----